



UNITED STATES PATENT AND TRADEMARK OFFICE

UNITED STATES DEPARTMENT OF COMMERCE
United States Patent and Trademark Office
Address: COMMISSIONER FOR PATENTS
P.O. Box 1450
Alexandria, Virginia 22313-1450
www.uspto.gov

APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
10/826,985	04/19/2004	Shijian Luo	2269-5565.1US (02-1124.01)	3493
63162 7590 01/28/2008 TRASK BRITT, P.C./ MICRON TECHNOLOGY P.O. BOX 2550 SALT LAKE CITY, UT 84110			EXAMINER STARK, JARRETT J	
			ART UNIT 2823	PAPER NUMBER
			NOTIFICATION DATE 01/28/2008	DELIVERY MODE ELECTRONIC

Please find below and/or attached an Office communication concerning this application or proceeding.

The time period for reply, if any, is set in the attached communication.

Notice of the Office communication was sent electronically on above-indicated "Notification Date" to the following e-mail address(es):

USPTOMail@traskbritt.com

Office Action Summary

Application No.

10/826,985

Applicant(s)

LUO ET AL.

Examiner

Jarrett J. Stark

Art Unit

2823

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

- 1) ☒ Responsive to communication(s) filed on 21 November 2007.
- 2a) ☒ This action is **FINAL**. 2b) ☐ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

- 4) ☒ Claim(s) 1-29 is/are pending in the application.
- 4a) Of the above claim(s) _____ is/are withdrawn from consideration.
- 5) ☐ Claim(s) _____ is/are allowed.
- 6) ☒ Claim(s) 1-29 is/are rejected.
- 7) ☐ Claim(s) _____ is/are objected to.
- 8) ☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☐ The drawing(s) filed on _____ is/are: a) ☐ accepted or b) ☐ objected to by the Examiner.
- Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).
- Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
- 11) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

- 12) ☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☐ All b) ☐ Some * c) ☐ None of:
- ☐ Certified copies of the priority documents have been received.
 - ☐ Certified copies of the priority documents have been received in Application No. _____.
 - ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

- ☐ Notice of References Cited (PTO-892)
- ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
- ☐ Information Disclosure Statement(s) (PTO/SB/08)
Paper No(s)/Mail Date _____
- ☐ Interview Summary (PTO-413)
Paper No(s)/Mail Date. _____
- ☐ Notice of Informal Patent Application
- ☐ Other: _____

DETAILED ACTION

Response to Arguments

Applicant's arguments with respect to the newly amended claims have been considered but are moot in view of the new ground(s) of rejection.

Note: Again it is pointed out that "self-healing" is a obvious property of B-stageable materials. When a B-stageable material is only partially cured (after first curing step) the b-stageable material is not yet a solid. In its semi-cured state the material still has fluid-like properties thus having the ability to flow. If the material does not have this ability then it would be a solid after the first curing step and not a b-stageable material. The fluid-like viscous properties of a semi-cured b-stageable material is what makes the material useful. Due to the flowable characteristics of the flowable material, the crack "self-heals" by the flowable material flowing together on each side of the crack and closing the crack.

Claim Rejections - 35 USC § 103

The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

Claims 1-8 and 19-29 are rejected under 35 U.S.C. 103(a) as being unpatentable over Tong et al. (US 2003/0171456).

Regarding claim 1, Tong discloses a method for forming a protective layer on a plurality of semiconductor device components, comprising:

providing a fabrication substrate carrying a plurality of semiconductor device components, adjacent semiconductor device components on the fabrication substrate being separated from one another by a street extending therebetween (Tong, ¶ [0013] –Inherently present before semiconductor chips or dies are separated/diced);

applying a protective material to active surfaces of at least the adjacent semiconductor device components (Tong, ¶ [0013] – B-stageable material – protective material that is semi-cured);

severing the protective material and at least partially severing the adjacent semiconductor device components from one another along the street (Tong, ¶ [0013] – Chips are dice after a being partially cured); and

subjecting at least the protective material to conditions (Tong, teaches the subjecting the structure to the same conditions) in which cracks and delaminated areas in the protective material that were formed during the at least partially severing are healed (Tong, ¶ [0013] – final complete curing – . If both are formed of the same material and same process of Applicant, then it naturally follows that any cracks formed in the soft b-stage material will undergo healing until the final curing process is complete. See previous response to arguments in the previously mailed Office Actions.), and

In the preferred embodiment, the composition is B-stageable, i.e., the composition is capable of an initial solidification that produces a, smooth, non-tacky coating on the semiconductor wafer. The B-stage solidification preferably occurs in at a temperature in the range of about 100.degree. C. to about 150.degree. C. After the B-stage process, a smooth, non-tacky solid coating is obtained on the wafer to ensure the clean dicing of the wafer into individual chips. The final, complete curing occurs at a second temperature that is higher than the B-stage curing temperature. Generally, the final cure of the composition occurs after the formation of the interconnections. (Tong, ¶ [0013])

Tong discloses fully curing the protective material after cracks and delaminated areas are healed. However does not explicitly disclose and (fully curing) before assembling a semiconductor device components of the adjacent semiconductor device components to another component of an electrical device.

Paragraph [0013] of Tong merely teaches that the final curing takes place after dicing and after the formation of the interconnects. In the instant example described in the paragraph, the final curing temperature is the same as the melting temperature of the solder which is used to bond the interconnects. Thus, in the example Tong solder bonds the structure at the same time as the final curing. It is obvious that the two structures must first be assembled (bring interconnects together to be bonded) before melting the solder which bonds the interconnects.

Regardless, it would however be obvious to one of ordinary skill in the art of perform the final cure before or after any assembly step.

Ex parte Rubin , 128 USPQ 440 (Bd. App. 1959) (Prior art reference disclosing a process of making a laminated sheet wherein a base sheet is first coated with a metallic film and thereafter impregnated with a thermosetting material was held to render prima facie obvious claims directed to a process of making a laminated sheet by reversing the order of the prior art process steps.). See also In re Burhans, 154 F.2d 690, 69 USPQ 330 (CCPA 1946) (selection of any order of performing process steps is prima facie obvious in the absence of

new or unexpected results); In re Gibson, 39 F.2d 975, 5 USPQ 230 (CCPA 1930) (Selection of any order of mixing ingredients is prima facie obvious.).

When there is a design need or market pressure to solve a problem and there are a finite number of identified, predictable solutions, a person of ordinary skill in the art has good reason to pursue the known options within his or her technical grasp. If this leads to the anticipated success, it is likely the product not of innovation but of ordinary skill and common sense. KSR Int'l Co v. Teleflex Inc.

Regarding claim 2, Tong discloses the method of claim 1, wherein providing comprises providing a fabrication substrate with at least one bond pad exposed at an active surface of each of the adjacent semiconductor device components (Tong, ¶ [0013]).

Regarding claim 3, Tong discloses the method of claim 2, wherein providing comprises providing a fabrication substrate with a plurality of semiconductor device components comprising at least one of semiconductor devices, interposers, and carrier substrates.

Regarding claim 4, Tong discloses the method of claim 2, wherein applying comprises applying the protective material such that the at least one bond pad of each of the plurality of semiconductor device components is

exposed through the protective material sufficiently to effect electrical contact therewith (Tong, ¶ [0013]).

Regarding claim 5, Tong discloses the method of claim 2, wherein providing comprises providing the fabrication substrate with each of the plurality of semiconductor device components having a conductive structure protruding from the at least one bond pad thereof (Tong, ¶ [0013]).

Regarding claim 6, Tong discloses the method of claim 5, wherein applying comprises applying the protective material such that the protective material contacts a base portion of at least one conductive structure (Tong, ¶ [0013]).

Regarding claim 7, Tong discloses the method of claim 6, wherein applying comprises forming a support structure around the base portion of the at least one conductive structure (Tong, ¶ [0013]).

Regarding claim 8, Tong discloses the method of claim 5, wherein applying comprises applying the protective material such that the protective material is spaced apart from a base portion of at least one conductive structure (Tong, ¶ [0013]).

Regarding claim 19, Tong discloses the method of claim 1, wherein applying comprises applying the protective material in a liquid state (Tong, ¶ [0013]).

Regarding claim 20, Tong discloses the method of claim 19, further comprising spreading the protective material to form a protective layer on the active surfaces (Tong, ¶ [0013]).

Regarding claim 21, Tong discloses the method of claim 20, wherein applying the protective material in the liquid state comprises applying a quantity of a substantially uncured polymer to the active surfaces (Tong, ¶ [0013]).

Regarding claim 22, Tong discloses the method of claim 21, further comprising partially curing the polymer prior to severing and at least partially severing (Tong, ¶ [0013]).

Regarding claim 23, Tong discloses the method of claim 22, wherein healing is effected while the polymer remains in a partially cured state (Tong, ¶ [0013]).

Regarding claim 24, Tong discloses the method of claim 23, further comprising further curing the polymer after subjecting at least the protective

material to conditions in which cracks and delaminated areas in the protective material that were formed during the at least partially severing are healed (Tong, ¶ [0013]).

Regarding claim 25, Tong discloses the method of claim 24, further comprising completely severing the adjacent semiconductor device components from one another along the street following after fully curing the protective material (Tong, ¶ [0013]).

Regarding claim 26, Tong discloses the method of claim 20, wherein applying the protective material in the liquid state comprises applying liquefied thermoplastic material to the active surfaces (Tong, ¶ [0013]).

Regarding claim 27, Tong discloses the method of claim 26, further comprising permitting or causing the thermoplastic material to at least partially harden prior to severing and at least partially severing (Tong, ¶ [0013]).

Regarding claim 28, Tong discloses the method of claim 26, wherein healing comprises heating at least portions of the thermoplastic material located over peripheral regions of the adjacent semiconductor device components following severing and at least partially severing (Tong, ¶ [0013]).

Regarding claim 29, Tong discloses the method of claim 27, further comprising completely severing the adjacent semiconductor device components from one another along the street after subjecting at least the protective material to conditions in which cracks and delaminated areas in the protective material that were formed during the at least partially severing are healed (Tong, ¶ [0013]).

Claims 9- 18 are rejected under 35 U.S.C. 103(a) as being unpatentable over Tong et al. (US 2003/0171456) as applied to claims 1-8 above, and further in view of Glen et al. (US 6,650,019 A1).

Regarding claim 9, Tong discloses the method of claim 1, however does not explicitly disclose wherein applying comprises applying a preformed sheet of protective material to the active surfaces (Tong, ¶ [0013]).

Glen et al. discloses at the time of the invention it was known in the art that the B-stageable material can be applied as preformed sheets (Glen, Col. 8 lines 36-58).

It would have been within the scope of one of ordinary skill in the art at the time of the invention to combine the teachings of Tong and Glen to enable the applying the B-stage material step of Tong to be performed according to the teachings of Glen because one of ordinary skill would have been motivated to look to alternative suitable methods of performing the disclosed application step

of Tong and art recognized suitability for an intended purpose has been recognized to be motivation to combine. MPEP 2144.07.

The spacer 50 can be made from a variety of materials, including a fiberglass matrix impregnated with a tacky, uncured (i.e., "B-stage") epoxy resin, or a ceramic, silicon or an oxide thereof, or alternatively, a plastic polymer sheet cut to the appropriate size. The adhesive layers 52 and 54 can be applied to the spacer 50 before it is attached to the first die 14, or alternatively, can be applied sequentially at the time the spacer is mounted to the die, first to the top surface of the first die 14, then to the top surface of the spacer before the second die is mounted on top of it. In yet another variation, the adhesive layer 54 used to mount the second die 16 on the spacer 50 can comprise the same adhesive material as the bead of uncured, fluid adhesive 40 dispensed around the perimeter 17 of the spacer 50, and can be deposited simultaneously therewith. In all cases, the layers of adhesive 52 and 54 on the spacer 50, and the layer 42 of adhesive 40 may all be simultaneously cured in a single step. (Glen, Col. 8 lines 36-58)

Regarding claim 10, Tong in view of Glen discloses the method of claim 9, wherein applying the preformed sheet comprises applying a preformed sheet comprising partially cured protective material (Glen, Col. 8 lines 36-58).

Regarding claim 11, Tong in view of Glen method of claim 9, wherein applying the preformed sheet comprises applying a preformed sheet comprising thermoplastic material.

It would have been obvious to one having ordinary skill in the art at the time the invention was made to use a thermoplastic material since it has been held to be within the general skill of a worker in the art to select a known material

on the base of its suitability, for its intended use involves only ordinary skill in the art. *In re Leshin*, 125 USPQ 416.

Regarding claim 12, Tong in view of Glen method of claim 9, wherein applying preformed sheet comprises applying a preformed sheet including apertures positioned to align with the at least one bond pad of each of the adjacent semiconductor device components (Tong, ¶ [0013]).

Regarding claim 13, Tong in view of Glen method of claim 2, wherein applying comprises applying a preformed sheet of protective material to the active surfaces (Glen, Col. 8 lines 36-58).

Regarding claim 14, Tong in view of Glen method of claim 13, wherein applying the preformed sheet comprises applying a preformed sheet comprising partially cured protective material (Glen, Col. 8 lines 36-58).

Regarding claim 15, Tong in view of Glen method of claim 13, wherein applying the preformed sheet comprises applying a preformed sheet comprising thermoplastic material.

It would have been obvious to one having ordinary skill in the art at the time the invention was made to use a thermoplastic material since it has been held to be within the general skill of a worker in the art to select a known material

on the base of its suitability, for its intended use involves only ordinary skill in the art. *In re Leshin*, 125 USPQ 416.

Regarding claim 16, Tong in view of Glen method of claim 13, wherein applying the preformed sheet comprises applying a preformed sheet including apertures therein positioned to align with the at least one bond pad of each of the adjacent semiconductor device components (Tong, ¶ [0013]).

Regarding claim 17, Tong in view of Glen method of claim 13, wherein applying the preformed sheet comprises applying the preformed sheet such that a conductive structure protruding from each of the adjacent semiconductor device components on the fabrication substrate passes through a plane of the preformed sheet (Tong, ¶ [0013]).

Regarding claim 18, Tong in view of Glen method of claim 17, further comprising heating each conductive structure prior to applying the preformed sheet (Tong, ¶ [0006]).

Conclusion

Applicant's amendment necessitated the new ground(s) of rejection presented in this Office action. Accordingly, **THIS ACTION IS MADE FINAL**. See MPEP § 706.07(a). Applicant is reminded of the extension of time policy as set forth in 37 CFR 1.136(a).

A shortened statutory period for reply to this final action is set to expire THREE MONTHS from the mailing date of this action. In the event a first reply is filed within TWO MONTHS of the mailing date of this final action and the advisory action is not mailed until after the end of the THREE-MONTH shortened statutory period, then the shortened statutory period will expire on the date the advisory action is mailed, and any extension fee pursuant to 37 CFR 1.136(a) will be calculated from the mailing date of the advisory action. In no event, however, will the statutory period for reply expire later than SIX MONTHS from the date of this final action.

Any inquiry concerning this communication or earlier communications from the examiner should be directed to Jarrett J. Stark whose telephone number is (571) 272-6005. The examiner can normally be reached on Monday - Thursday 7:00AM - 5:30PM.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Matthew Smith can be reached on (571) 272-1907. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see <http://pair-direct.uspto.gov>. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free). If you would like assistance from a USPTO Customer Service Representative or access to the automated information system, call 800-786-9199 (IN USA OR CANADA) or 571-272-1000.

Jarrett J Stark
Examiner
Art Unit 2823

JJS
January 16, 2008


MICHELLE ESTRADA
PRIMARY EXAMINER